

**ADJUSTABLE BRAKE AND THROTTLE PEDAL ASSEMBLY**

**Related Application**

This application is a continuation of U.S. Serial No. 10/080,006 filed 2/21/02 (pending), which claims priority of U.S. Provisional Application Serial 5 No. 60/270,458 filed February 21, 2001, and is incorporated herein by reference.

**Background of the Invention**

Pedal adjustment systems for vehicles have been used for some time to adjust the position of the pedal with respect to the vehicle operator. In the past, 10 pedal adjustment systems have been generally developed for use with pedals which are mechanically linked to actuators such as brake cylinders, clutches and throttles. Typically, most of these systems are designed to maintain the position of the end of the linkage during adjustment of the pedal position. Examples of such systems are disclosed in U.S. Patent No. 5,351,573 to 15 Cicotte. In the preferred embodiment of the invention, the electronic control is an electronic throttle control ("ETC").

Developments in engine control technology have led to development of 20 "fly-by-wire" control systems. Fly-by-wire systems include a pedal arm connected to an electronic position sensor which senses the position of the pedal and sends an electrical signal to a control unit indicative of the position of the pedal. Pedal adjuster assemblies for mechanically operated controls are not well suited for adjustment fly-by-wire electronic control systems. Accordingly, it is desirable to have a simple and efficient pedal adjustment

system which may be used with an electronic throttle control system to simultaneously adjust both the brake and throttle pedals.

**Summary of the Invention**

An adjustable brake and throttle pedal assembly for a vehicle with an electronic throttle control includes a throttle pedal arm assembly pivotally mounted to a support bracket. The electronic throttle control unit is mounted to the bracket at the pivot point for the throttle pedal arm assembly. The throttle pedal arm assembly includes a pedal arm and a support arm. A first adjustment mechanism extends in a space formed between the support arm and pedal arm.

5        The adjustable brake and throttle pedal assembly also includes a brake pedal arm mounted to the bracket. A second adjustment mechanism is operatively attached to the brake pedal arm. The second adjustment mechanism is operatively connected to the first adjustment mechanism. The first adjustment mechanism and second adjustment mechanism cooperatively position the throttle pedal arm and the brake pedal arm at a selected position between a retracted position and an extended position.

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**Description of the Drawings**

Further useful details of the invention will be seen from the independent claims and the account now to be given of the different forms of

20      the invention given by way of example only using the figures.

Fig. 1 is a perspective view of an adjustable brake and throttle pedal assembly in accordance with the present invention.

Fig. 2 is a side view of the throttle pedal for the adjustable brake and throttle assembly of Fig. 1 in accordance with the present invention.

Fig. 3 is a side view of the pedal assembly of Fig. 1 in a non-adjusted and adjusted position in accordance with the present invention.

5 Fig. 4 is a sectional view of the electric control unit for the adjustable brake and throttle pedal assembly of Fig. 1 in accordance with the present invention.

**Detailed Description of the Preferred Embodiment**

A pedal assembly 10 suitable for use with a vehicle is shown in Figs. 1  
10 and 2. The pedal assembly 10 includes an adjustable throttle pedal assembly 12 and an adjustable brake pedal assembly 14 mounted to a bracket 16. The bracket 16 is fixedly mounted to the vehicle as is known in the art. The throttle control pedal assembly 12 includes a pedal arm assembly 18 connected to a conventional electronic throttle control unit (ETC) 20. The ETC 20 generates a  
15 signal indicative of the position of a pedal throughout the range of depression. The signal is delivered to a CPU (not shown) which controls the ignition and fuel supply system to increase or decrease the speed of the engine.

As shown in Fig. 2, the pedal arm assembly 18 includes a screw rod drive assembly 22 which extends between a support arm 24 and pedal arm 26.  
20 The screw rod drive assembly 22, as discussed below, is operable to adjust the position of the throttle pedal arm 26 with respect to the support arm 24.

The throttle pedal arm 26 has a vertically extending upper portion 28 and a C-shaped lower portion 30 having a lower end 34 supporting an

elongated pedal 32. The upper portion 28 is pivotally mounted to the support arm 24 by a pin 35. The lower portion 30 of the pedal arm curves first to the bracket under the drive assembly 22 and then rearwardly to support the pedal 32.

5 As shown in Fig. 2, support arm 24 has a lower portion 40 and an upper portion 42. The lower portion extends upwardly to parallel the upper portion 28 of the pedal arm 26. The upper portion 42 extends rearwardly over the drive assembly 22 to support the pedal arm 26.

10 As shown in Fig. 4, the lower portion 40 of the portion of the support arm has a pair of bosses 44 which are received in apertures in arms of the bracket 16 which support the throttle control pedal assembly 12 for pivotal movement when the throttle pedal 32 is depressed. Extending coaxially from one of the bosses 44 is a blade 46 which is received within the ETC unit 20 mounted to the bracket 16. As is known in the art, the blade 46 turns a 15 potentiometer 48 so that movement of the throttle pedal 32 and throttle pedal arm assembly 18 rotates the blade 46 which turns a potentiometer 48 of the sensor 20 to generate an electrical signal proportional to position the throttle pedal 32. The signal is then carried by a wire harness to a CPU which controls the throttle.

20 As shown in Fig. 2, the drive assembly 22 extends horizontally between the support arm 24 and the pedal arm 26 in a space formed between the arms 24, 26. The drive assembly 22 includes a housing 50 having a worm, a worm gear and a portion of a screw rod 52. Drive mechanisms of this type are

described in U.S. Patent No. 6,151,986. One end of the screw rod 52 extends from an aperture in the rear of the housing 50 to the throttle pedal arm 26. The other end of the screw rod 52 is received within a threaded bore in a driven worm gear (not shown). The drive worm is mounted in meshing engagement with the driven worm gear. As shown in Fig. 1, the drive worm is connected to a coupling 56 for connection to a flexible drive cable 58 and a remote motor 60.

The adjustable brake pedal assembly 14 includes a pedal arm 64. One end of the pedal arm 64 is mounted to the bracket 16, and the other end has a 10 pedal pad 66 mounted thereto. In the present embodiment, the motor 60 is mounted to the adjustable brake pedal assembly 14 and is also used to drive a screw rod mechanism 62 for adjusting the brake pedal arm 64 position. However, the motor 60 can be mounted directly to the accelerator pedal adjustment assembly 12 in the same fashion as with the adjustable brake pedal 15 assembly 14 or at any desired remote location. Activation of the motor 60 turns the drive cable 58 to rotate the worm gear and in turn the driven worm to threadably move the screw rod 52 inwardly and outwardly depending upon the direction of rotation of the motor 60 and gears. Movement of the screw rod 52 pivots the throttle pedal arm 28 rearwardly from a retracted position as shown 20 in Fig. 2 or forwardly to an extended position to place the pedal 32 at a desired location. Similarly, movement of the screw rod mechanism 62 pivots the brake pedal arm 64 simultaneously with the throttle pedal arm 28.

As shown in Fig. 3, the elongated pedal 32 permits the user to contact the pedal with the ball of his foot 36 (shown at A<sup>1</sup> and A<sup>2</sup>) while maintaining the heel on the floor 38 of the vehicle regardless of the position of the pedal. The pedal curves downwardly and has a length of approximately six inches.

- 5       The curvature of the pedal arm is chosen to increase in the radius of curvature as it curves downwardly to provide clearance for the sole of the foot when the pedal is moved rearwardly. Thus, the contact point of the ball of the foot 36 is permitted to move from the upper portion of the pedal from A<sup>1</sup> when at the retracted position to the lower portion of the pedal 32 at A<sup>2</sup> downwardly as the
- 10      pedal arm 26 is adjusted rearwardly to the extended position. The brake pedal assembly 14 is adjusted in a similar manner.

Advantageously, the adjustable throttle and brake pedal assembly provides for the simultaneous adjustment of each pedal within a minimum amount of space.

- 15      The present invention has been described in an illustrative manner. It is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the
- 20      present invention may be practiced other than as specifically described.